United States Patent

[11] 3,595,163

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[21] Appl. No. **850,390**
[22] Filed **Aug. 15, 1969**
[45] Patented **July 27, 1971**
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[32] Priority **Aug. 29, 1968**
[33] **Germany**
[31] **P 17 77 057.9**

[54] **FLY PRESS**
13 Claims, 6 Drawing Figs.

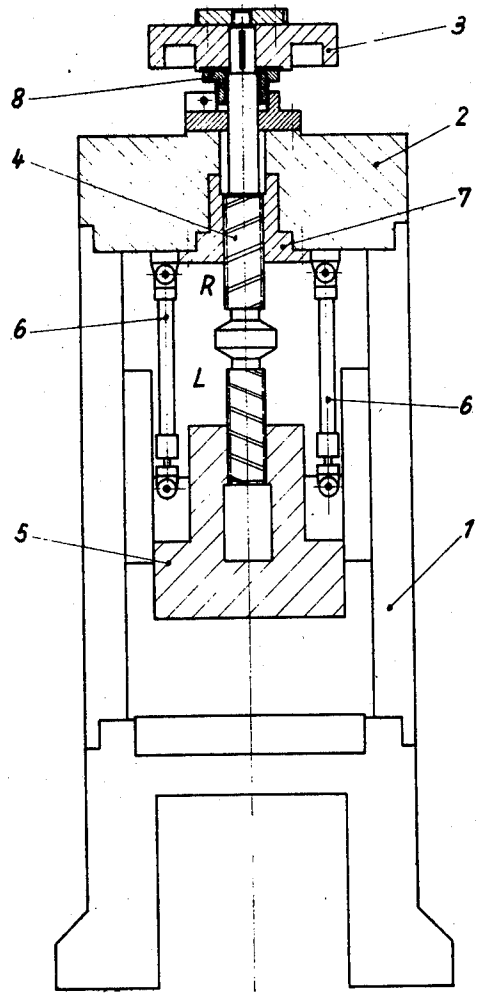
[52] **U.S. Cl.** **100/270,** 72/454, 100/290
[51] **Int. Cl.** **B30b 1/08**
[50] **Field of Search** 72/454; 83/631; 100/288, 289, 270, 271

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Primary Examiner—Billy J. Wilhite
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ABSTRACT: A nut is carried by a traverse, which forms part of a frame. A press screw has two oppositely handed screw threads near opposite ends. One of said screw threads is in threaded engagement with said nut. A press ram is in threaded engagement with the other of said screw threads. A flywheel is mounted on said press screw for rotation therewith. Drive means are provided to reciprocate said press screw so that said ram is reciprocated at a higher speed than said press screw.



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SHEET 1 OF 6

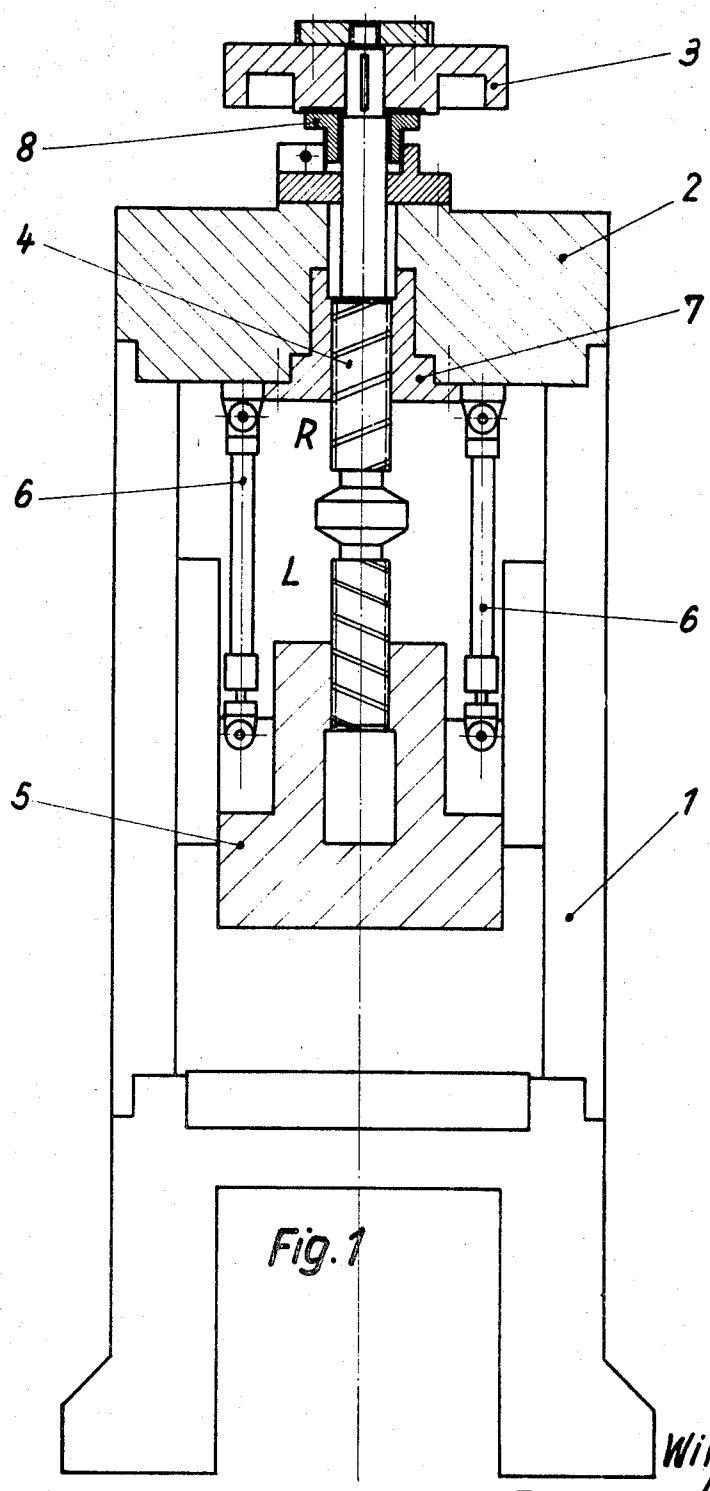


Fig. 1

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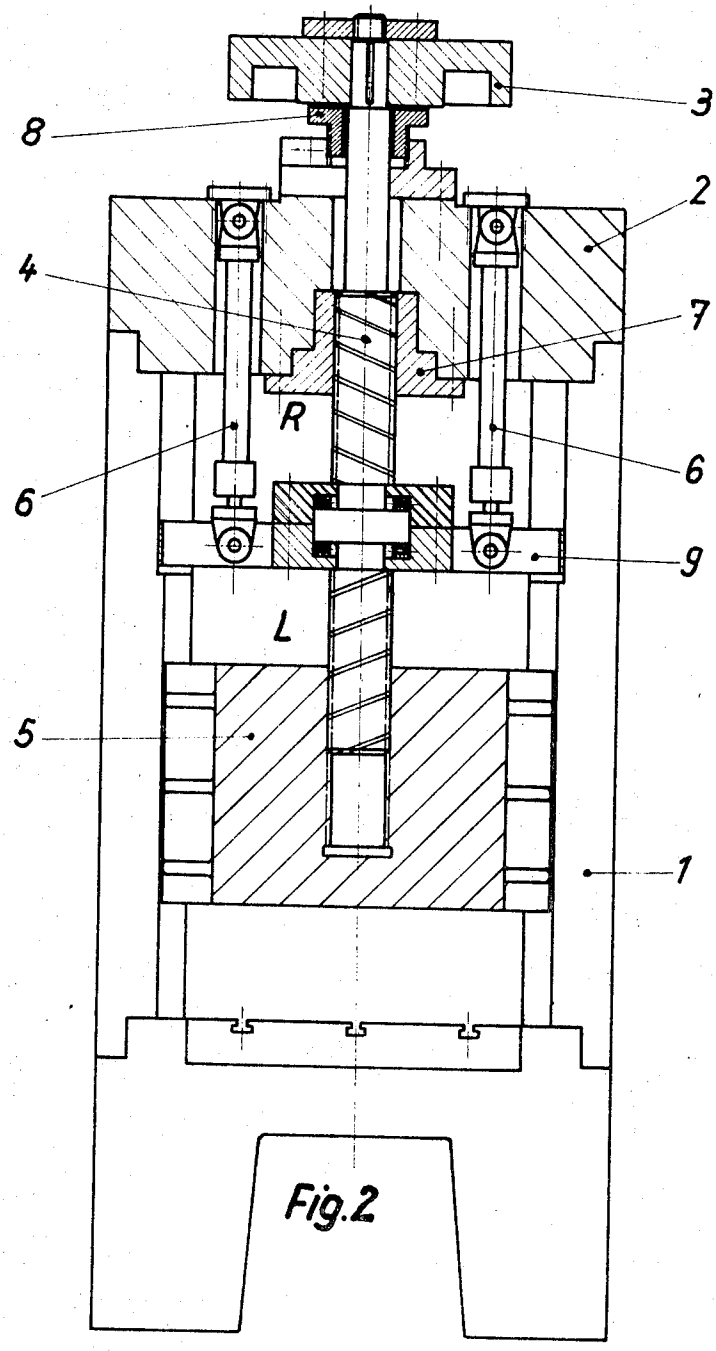


Fig.2

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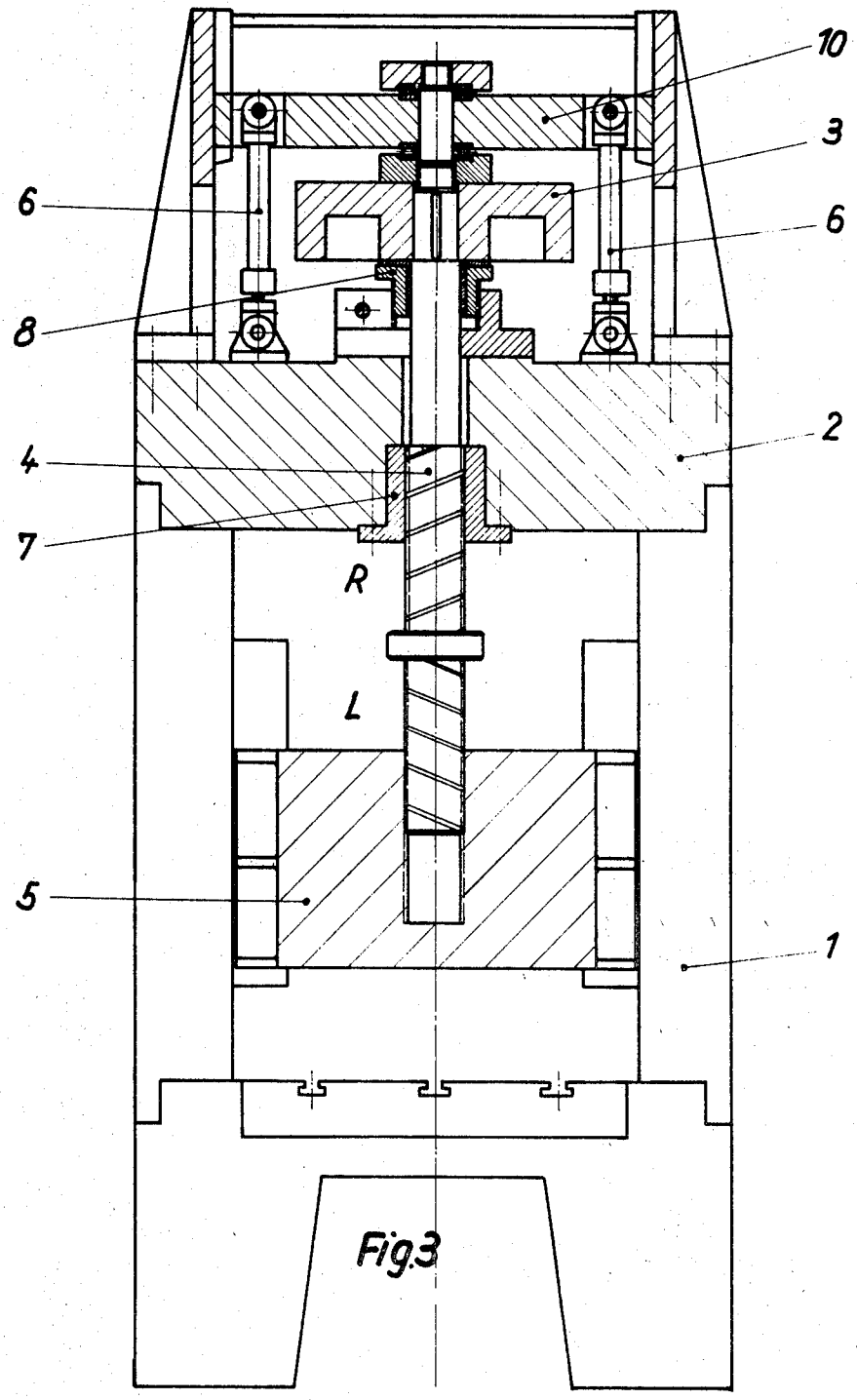


Fig.3

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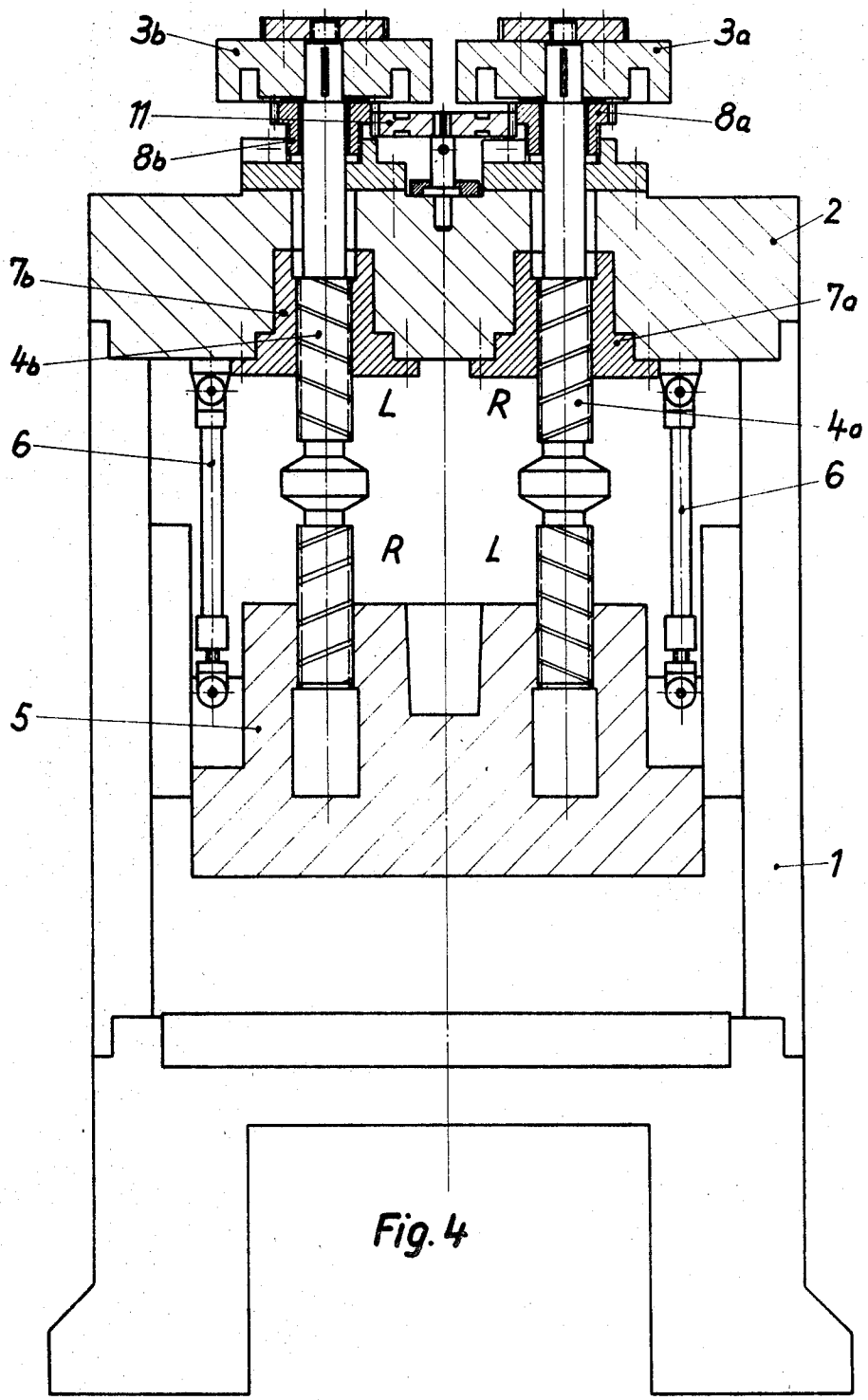
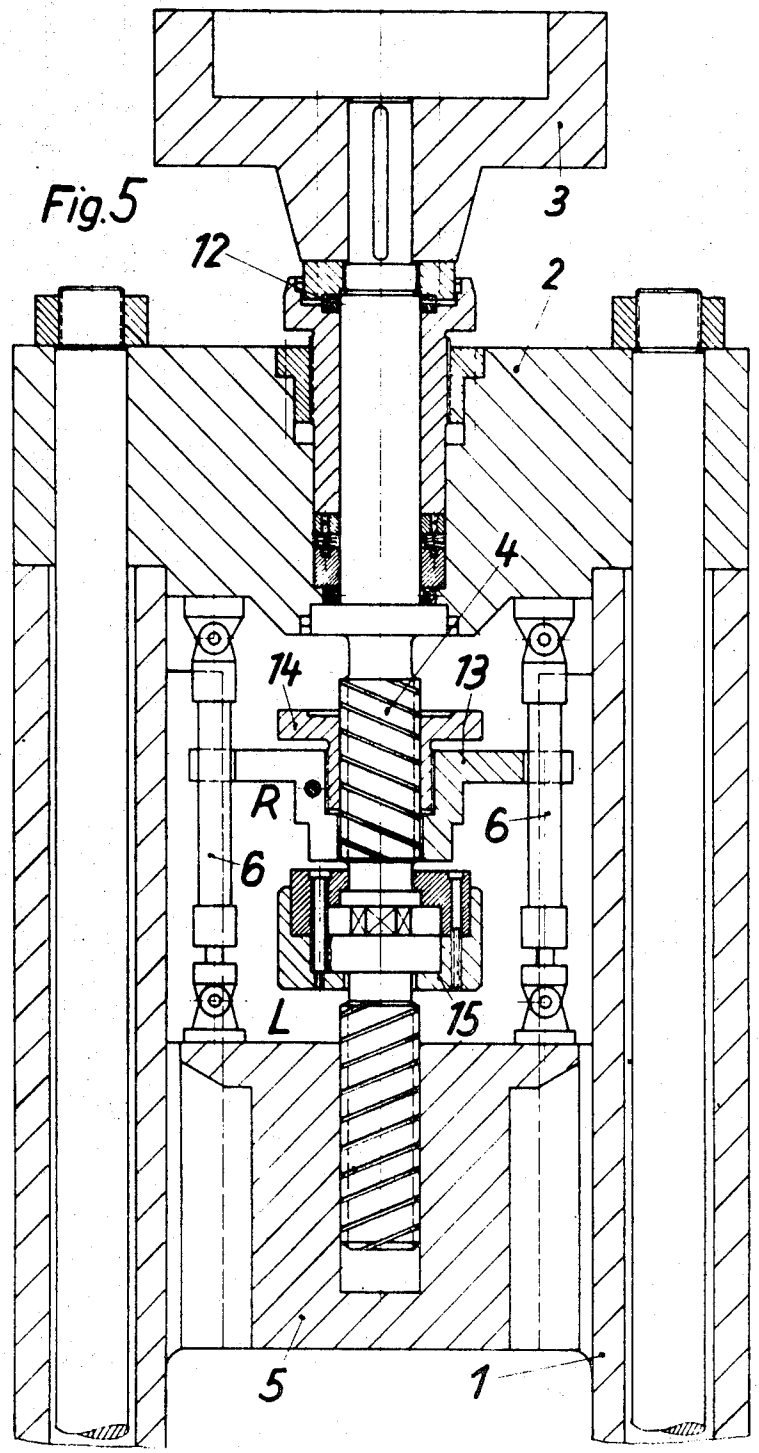


Fig. 4

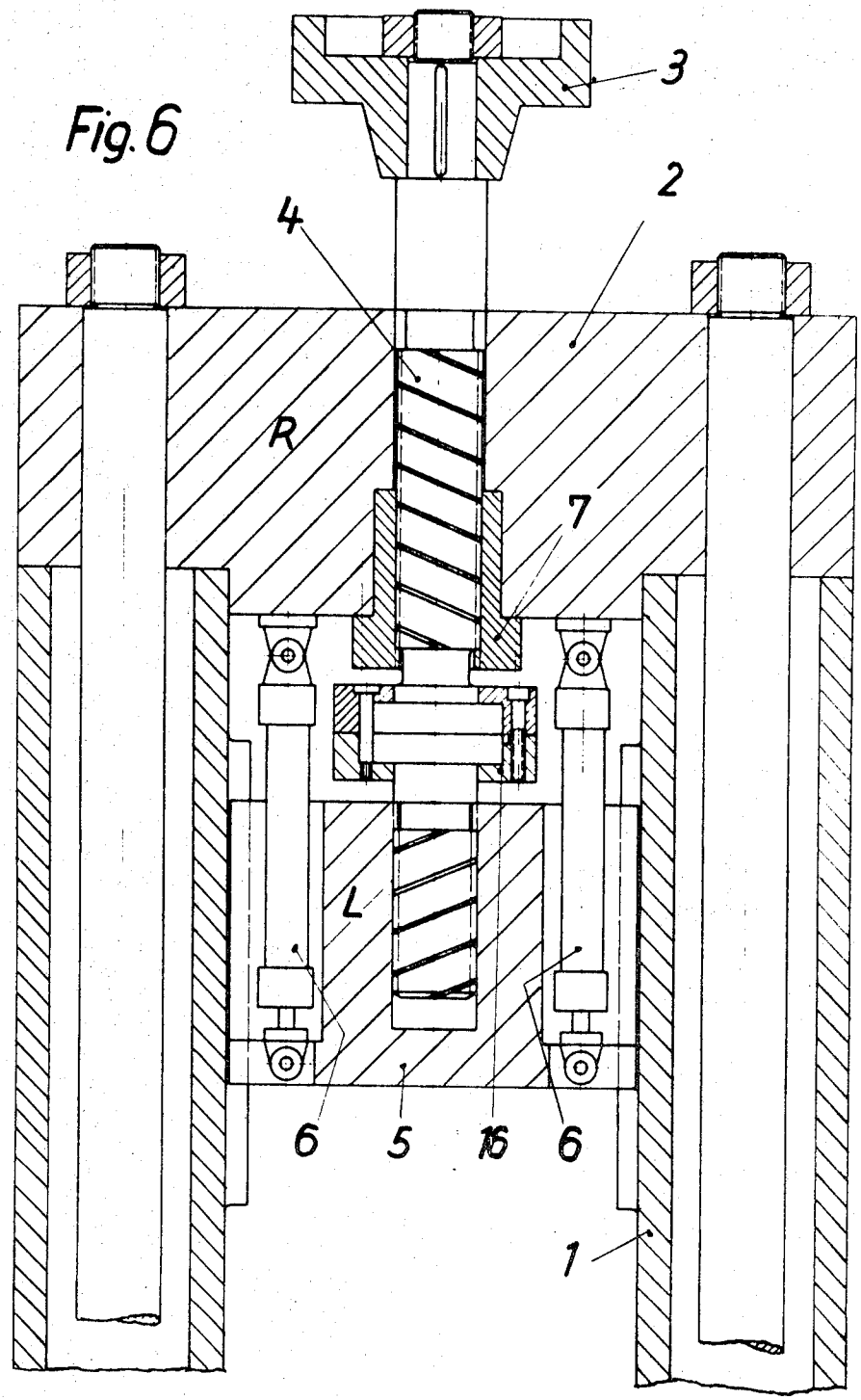
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Fig.5



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Fig. 6



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FLY PRESS

This invention relates to a fly press which comprises a flywheel and a press screw and in which the vertically reciprocating press ram is vertically reciprocated preferably by double-acting piston-cylinder units.

In modern high-speed fly presses, there is a need to produce a high acceleration of masses. This involves a high power requirement as well as heavy loads on the machine and a vibration thereof. This vibration is transmitted to the foundations.

The main object of the invention is to provide a high-speed fly press, which is operable with small mass forces and has a low power requirement and in which the flywheel forces are balanced within the frame of the machine. The fly press according to the invention is characterized in that the press screw carries two oppositely handed screw threads, which are in threaded engagement with a nut carried by the traverse of the press frame, particularly a nut which is rigid with said traverse and with the press ram so that the later moves up and down at twice the speed of the screw. This arrangement enables a given number of press cycles to be performed per unit of time with a lower input power than was required before.

The piston-cylinder units which at one end thereof engage the traverse and preferably extend through the same may engage at their other end a screw-mounting bridge member disposed between the oppositely handed screw threads. Alternatively, the piston-cylinder units bear at one end on the traverse of the press and at the other hand on a screw-mounting bridge disposed over the flywheel. In both cases, the piston-cylinder units move only at one-half of the speed of the vertically reciprocating ram of the press. Because the stroke of the piston is only one-half of the stroke of the ram, lower oil flow rates are sufficient so that the space requirement and structural expenditure are reduced and an overheating of he control valves is avoided.

To compensate the torque action of the flywheel, the press may have two or more press screws, each of which is provided with a flywheel and oppositely handed screw threads and these press screws may be arranged to rotate in opposite senses.

Embodiments of the fly presses according to the invention are shown by way of example in the drawing, in which

FIGS. 1 to 3 are sectional views showing fly presses according to the invention provided with a screw which is threadedly engaged with a nut that is rigid with the frame.

FIG. 4 is a sectional view taken through a fly press according to the invention, which is provided with double screws.

FIGS. 5 and 6 are sectional views showing a fly press according to the invention comprising a flywheel which is mounted in the frame and a split screw which is threadedly connected to the frame.

In all embodiments shown by way of example in the drawing, the press comprises a press frame 1 provided with a traverse 2, also a flywheel 3 and a press screw 4 provided with a press ram 5, which is guided in the frame, and two piston-cylinder units 6.

In the first embodiment shown in FIG. 1, the press screw 4 is provided with two oppositely handed screw threads R and L. One of these screw threads is in threaded engagement with a nut 7 that is rigid with the frame. The other of these screw threads is in threaded engagement with the press ram 5. Piston-cylinder units 6 are connected by pivot bearings to the traverse 2 and the press ram 5. The flywheel 3 is vertically reciprocable with the screw 4 and engageable with an annular stop 8, which is screw-threadedly adjustable. The flywheel performs a vertical reciprocation at one-half of the speed of the press ram.

In the second embodiment shown in FIG. 2, the press screw 4 is provided with oppositely handed screw threads R and L, which are in threaded engagement with the press ram 5 and with a nut 7 that is rigid with the frame. The piston-cylinder units 6 extend near one end through the traverse 2 and at the other end engage a screw-mounting bridge 9 disposed between the oppositely handed screw threads. The flywheel 3 is vertically reciprocable with the screw 4 and engageable with an annular stop 8, which is adjustable by means of screw threads. The piston-cylinder units are operated at one-half of the speed of the vertically reciprocating press ram.

In the third embodiment, shown in FIG. 3, the press screw 4 is provided with oppositely handed screw threads and is movably mounted in a nut 7, which is rigid with the frame, and in the press ram 5. The piston-cylinder units 6 bear at one end on the traverse 2 and at the other end on a screw-mounting bridge 10, which is disposed over the flywheel 3. The flywheel 3 moves up and down with the screw 4 and is engageable with an annular stop, which is screw-threadedly adjustable. The piston-cylinder units operate also only at one-half of the speed of the vertically reciprocating press ram.

In the fourth embodiment, shown in FIG. 4, the press comprises two press screws 4*a* and 4*b*, which rotate in opposite senses and are provided each with two oppositely handed screw threads R and L and with a flywheel 3*a* or 3*b*. Each of these press screws 4*a* and 4*b* is movably mounted at one end in a nut 7*a* or 7*b*, which is rigid with the frame, and at the other end in the press ram 5. The piston-cylinder units 6 are disposed between the traverse 2 and the press ram 5. There are also annular stops 8*a* and 8*b*, which are engageable with the flywheels 3*a* and 3*b* and adjustable at the same time by means of a gear 11, which is interposed between them. In this arrangement, the torque action of the flywheels is balanced because the flywheels rotate in opposite senses in the frame of the machine.

In the fifth embodiment, shown in FIG. 5, the flywheel 3 is mounted in the frame by a thrust bearing 12 and the press screw 4 provided with oppositely handed screw threads R and L is mounted at one end in a nut 14, which by means of a bridge member is guided relative to the frame, and at the other end in the press ram 5, which is guided in the frame. The piston-cylinder units 6 are again disposed between the traverse 2 and the press ram 5. The press screw 4 consists of two parts, which are connected by a connecting flange 15. The movement of the ram may be limited by a stop consisting of and is bridge member 13, which carries the nut 14 and is guided by the frame.

In the sixth embodiment shown in FIG. 6 the press screw 4 is provided with oppositely handed screw threads R and L and is mounted a tone end in a nut 7, which is rigid with the frame, and at the other end in the press ram 5. The piston-cylinder units 6 are disposed between the traverse 2 and the press ram 5 and just as in all other embodiments are pivotally connected at both ends. In the last embodiment too, the press screw 4 consists of two parts, which are connected by a connecting flange 16. The latter may also serve as a limiting stop.

What I claim is:

1. A fly press, which comprises
a frame,
a nut carried by said frame,
a press screw having two oppositely handed screw threads near opposite ends,
one of said screw threads being in threaded engagement with said nut,
a press ram which is in threaded engagement with the other of said screw threads, axially movable relative to said frame and held against rotation relative thereto,
a flywheel mounted on said press screw for rotation therewith, and
drive means for reciprocating said ram.

2. A fly press as set forth in claim 1, in which said drive means comprise double-acting piston-cylinder units.

3. A fly press as set forth in claim 2, in which
said press screw is rotatably mounted in and axially fixed to a bridge member disposed between said screw threads,
said frame comprises a traverse, and
said piston-cylinder units are connected at one end to said traverse and at the other end to said bridge member,

whereby said press ram is arranged to reciprocate at a speed which is higher than that at which said piston-cylinder units are operated.

4. A fly press as set forth in claim 3, in which said piston-cylinder units extend through said traverse.

5. A fly press as set forth in claim 2, in which

said flywheel is mounted on said screw above both said screw threads,

said press screw is rotatably mounted in and axially fixed to a bridge member disposed over said flywheel,

said frame comprises a traverse, and

said piston-cylinder units are connected at one end to said traverse and at the other end to said bridge member,

whereby said press ram is arranged to reciprocate at a speed which is higher than that at which said piston-cylinder units are operated.

6. A fly press as set forth in claim 1, in which said nut is rigid with said frame.

7. A fly press as set forth in claim 1, which comprises

a second nut carried by said frame,

a second press screw having two oppositely handed screw threads near opposite ends,

one of said screw threads of said second press screw being in threaded engagement with said second nut,

said press ram being in threaded engagement with the other of said screw threads of said second press screw, and

a second flywheel mounted on said second press screw for rotation therewith,

said screw threads and nuts being designed to impart a rotation in opposite senses to said two press screws in response to an axial movement of said ram,

whereby said flywheels exert mutually balancing torques on said frame.

8. A fly press as set forth in claim 7, in which

said nuts are rigid with said frame,

said press screws are axially movable relative to said frame,

said flywheels are axially fixed to said press screws,

said frame carries two annular stops, which are engageable by said flywheels to limit the axial movement of said press screws,

said annular stops are screw-threadedly engaged with said frame to permit of an adjustment of said stops, and

a gear is interposed between and in driving connection with said stops to enable a simultaneous adjustment of said stops by an operation of said gear.

9. A fly press as set forth in claim 1, in which

said nut is rigid with said frame,

said press screw is axially movable relative to said frame,

said flywheel is axially fixed to said press screw,

said frame carries an annular stop which is engageable by said flywheel to limit the axial movement of said press screw, and

said annular stop is screw-threadedly engaged with said frame to permit of an adjustment of said stop.

10. A fly press as set forth in claim 1, which comprises

nut-mounting means carried by said frame and mounting said nut so that the same is axially movable relative to said frame and held against rotation relative thereto.

11. A fly press as set forth in claim 10, in which said nut is engageable with said frame to limit the movement of said ram.

12. A fly press as set forth in claim 1, in which

said screw carries a flange, which is engageable with said nut to limit the movement of said ram.

13. A fly press as set forth in claim 12, in which

said screw consists of two axially aligned parts, which are connected by said flange.